



Urban forestry A quick reference guide.

2023



The Life UrbanGreeningPlans project has received funding from the LIFE Programme of the European Union.



Purpose.

This simple guide has been created with the purpose of facilitate the planning, design and management of urban forests, a fundamental intervention that aims to restore or create forests in urban areas.

In particular, this "protocol" is designed to give useful guidelines concerning

different topic that range from agronomical issues such as which plant to use or the planting design to the relationship and the communication to adopt with people.

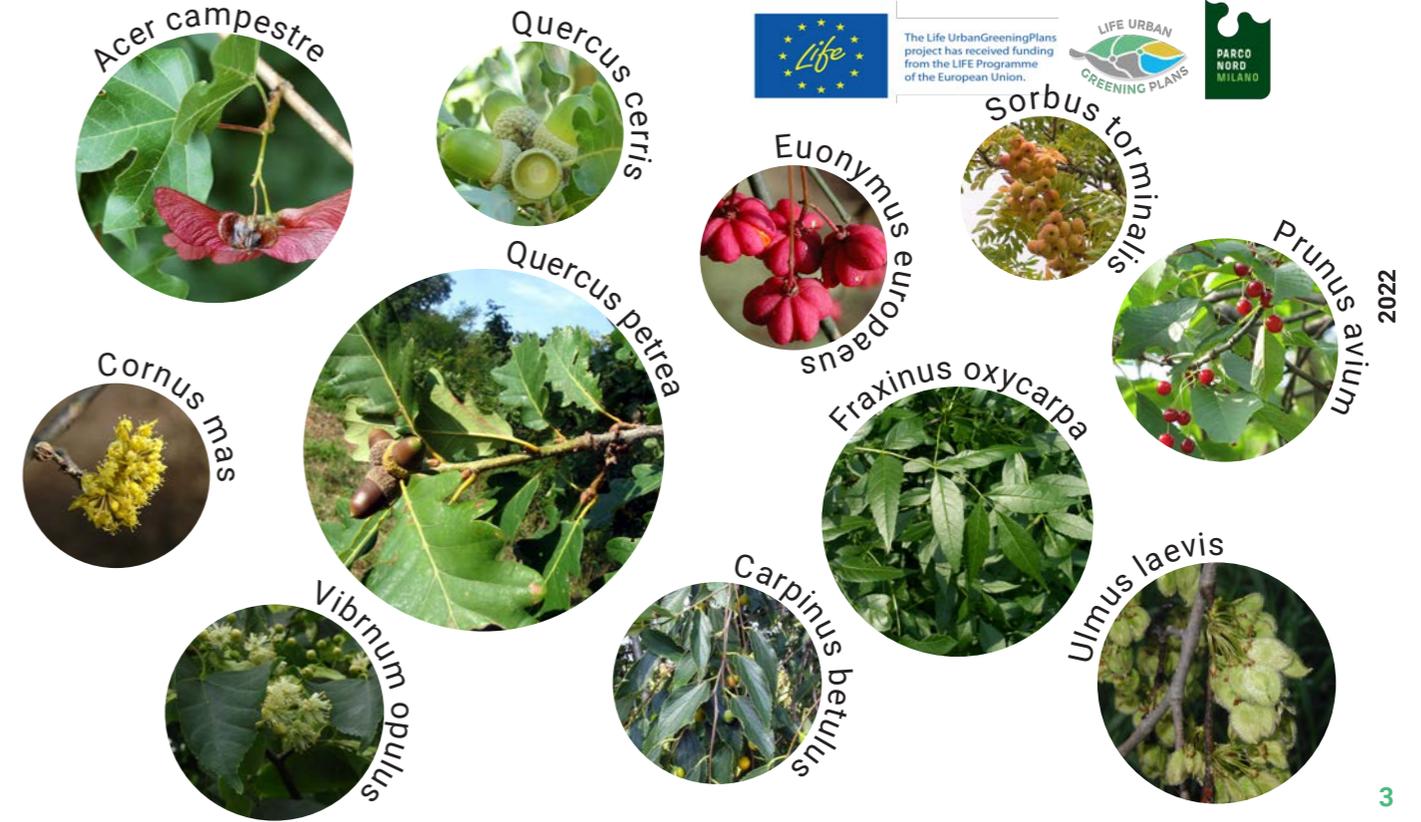
Urban forest and urban forestry.

The Food and Agriculture Organization of the United Nations (FAO) describes urban forests as "networks or systems comprising all woodlands, groups of trees, and individual trees located in urban and peri-urban areas; they include, therefore, forests, street trees, trees in parks and gardens, and trees in derelict corners." (FAO, 2017).

Also, in the same paper, the FAO describes urban forestry as "an integrated, interdisciplinary, participatory and strategic approach to planning and managing tree resources

in urban and peri-urban areas for their economic, environmental and sociocultural benefits. In practical terms, UPF may consist in planting trees where they never existed before, in enhancing existing natural vegetation or in harmonizing urban sprawl into green spaces" (FAO, 2017).

This guide is based on Parco Nord Milano experience on urban forestry consisting of recreating temperate low-land forests in urban and peri-urban areas.



Plant photos are taken from <https://www.actaplantarum.org/flora/flora.php>



Keep in mind!

Urban forestry should be carried out with certified plantings and all the accessories, such as shelter, are essential on the field to ensure the protection and the egraftment of trees and shrubs.



Pay attention!

Climate change (extreme drought or heat) has to be carefully considered during the whole process to guarantee its success. Irrigation has to be considered and carried out carefully at least for the first two years to ensure the best results.

Planning and design.

In order to realize a urban forest that respond both to users and environment need and it's integrated with the landscape in which is situated, there are different topics that need to be considered careffully and all-together. This chapter aims to help you focus on the key aspcrets of the whole procedure, so that your project will have strong foundations. However, it is important to clarify that the planning and designing, and also the implementing and managing, of an urban forest gives the best results when you are working with a multidisciplinary group project (foresters, agronomists, botanists, ecologists, landscape architects).



Now follows a list of key actions to implement so that the main aspects of a good design and planning are considered. This list is a guide through which it can be developed a own way of making things.

- 1 Check all the policies, laws, regulations and standards** effective in your project area that can guide, assist or hamper the project.
- 2 Collect data about the hypothetical area where you want to implement the forest** such as soil characteristics, microclimate, slope and exposure. This information is useful to indentify which will be your first actions.
- 3 Identify the correct plants species to use.** It is essential to use vegetation that is suited for forestry (both shrubs and trees) but also is adapted to local condition. In order to recreate a temperate lowlands forest, it is import to look for three m: 1 type of vegetation: the inner core of the forest hosts dominat trees species and schiaphilous shrubs while the outer zone is composed of heliophilous shrubs species.
- 4 Choose the planting design.** This requires good plant's knowledge as each individual should thrive and not prevail on the others: considering only the scheme to follow, a planting design composed of parallel curved lines along which different trees and shrubs are planted, is the best choice, combinig lascape, naturalistic and managing aspects. It is important to say that the design usally starts with 2000 seedlings per m² and, at maturuty, it will naturally decrease to 700 plants per m².
- 5 Prepare a time schedule** of all the activities required for making the urban forest. Also **estimate all the cost** you will have to sustain to see if it's econimical sustainable.
- 6 Start partnership** with companies, projects or NGOs with kindred ideals, it is useful to engage the greater numeber of people and to do effective fundraising.

Implementation.

Once the design of the new urban forest is done, it is time to make it real.

First things first, it is very useful to know the precise soil characteristics so it will be useful to send some soil sample for a lab analysis. Knowing the data, it is possible to work the soil and plant trees and shrubs and two ways are possible. If your plot of land is poor of stones and other hard materials, you can perform a mechanical soil plough or tillage. Should that not be the case, it is possible to avoid soil work and open each pitt with a bucket or a drill.

In both cases, after (in case of plough) or before (in case of bucket or drill use), the traking of the new forest has to be carried out (see image next): the quicker way is to start with tracking a central cruve line and then drawing its paralles, adjusting the result at the edges in case. After that, the planting of each plants is usually performed manually. If it's necessary, is useful to put some manure at the bottom of the pit for fertilization purposes.

It is important to say that plantation ends when also acessories are put in place (mulching disc, shelter and a stake). In particular, the shelter shoul be made of a very photoresistant plastic to guarantee its endurance (other materils sadly do not last enough).

The outer line is filled with heliophilous shrubs.
The planting distance along the line between each plants is 1,3-1,7 m .

The tilt of the line is changed if it becomes too straight.

In the inner core, there are trees and schiaphilous shrubs. Trees are planted to form monospecific areas. The planting distance on the same line between each plants is 1,65-2,8 m .

An example of a reforastation project

Legend

-  Trees
-  Shrubs

The distance between two lines is 2,5-3 m and it should not be lower otherwise management vehicule cannot enter the area.

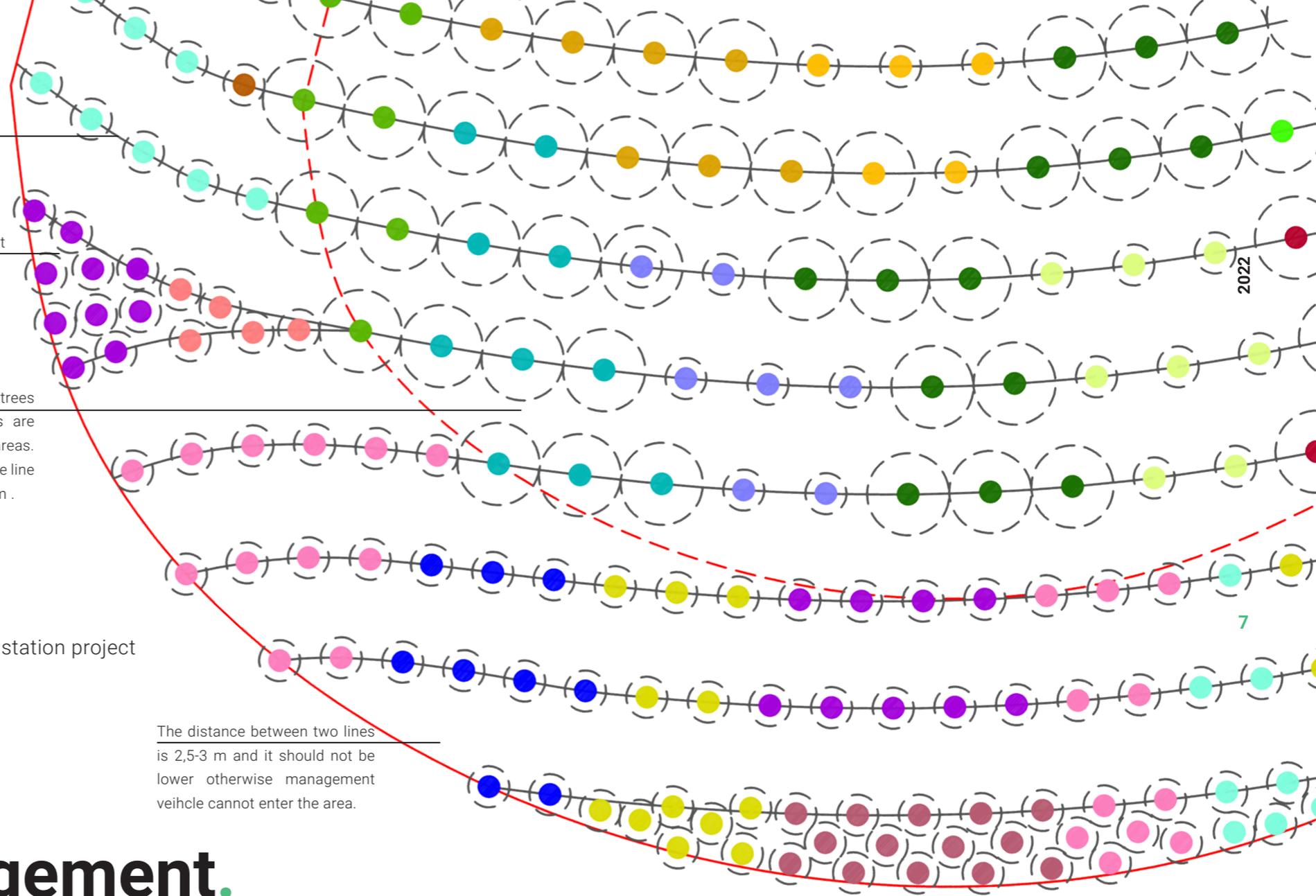
Management.

When it comes to manage an urban forest, the main topics to keep in mind are:

- **Irrigation.** It is true that the tree and shrub should be choice having climate change as one of main drivers of decision making but water needs are one of the key aspects to consider , expecially if we are talking of new plantations. Plants must be irrigated at least the first two years so as to guarantee the least number of deaths.

- **Sowing.** During the growing season only the area beetween the rows should be sowed regularly: this is crucial to allow both the performing of management activities and flower blossoming. Also, during extreme hot and dry season, tall herbs guarantee soil cover and the reduction of soil temperature and, by doing so, its water loss. At the end of the growing season, the entire area should be sowed with a mulch cut.

- **Failed plantation.** At the end of the growing season, a death rate of 5-10 %. If this rate is higher (20/40%), plants should be replaced before the beginning of the next spring.
- **Removal of accessories.** When accessories are non longer needed, they must be removed as quicly as possible, specifically the shelter so as to reduce the ammount of microplastic introduced in the environment.



Effects assessment.

Once the urban forest is done, it is useful to understand the effects that the new plantation has on the surrounding area.

Different are the topics that can be checked, among these there:

- The quantity of CO₂ liberated into the atmosphere for the realization of the forest and the CO₂ stocked in wood;
- The coolin effect of forest (i.e. heat map);
- The removal of air particulate matter in the surranding area;
- The presence of little mammals and birds.
- Other ecosystem services.

To evaluate these effects, different methodolgies can be used. As for ecosystems services are concerned, free models to esteem the quality and quanty of the ES may be useful. Speaking of bird and little mammals' presence, an assessment can be done by permanent staff (PNM has the ecologiucal guards) or by creating birdwatching areas or tours.



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Communication and engagement.

In order to enhance the success of the project, a complete and proper communication together with citizen egagement play a key role.

In particulate, three are the main aspects to be taken into account:

- **Project communication.** A complete communication can ensure that people may grow affection towards the urban forest leading to a more respectful and protective approach towards it: this will reduce acts of vandalism or any other detrimental act (i.e. plants removal).
- **Involvement and engagement.** If you want to purse bottom-up projects, communication is the best way to engage people in support it both economically but also socially. To do so, you can organize workshops (see example beside), fundraisings, meetings ecc.
- **Partnerships and bussiness engagement.** Having or creating partnerships with ONG or projects (e.g. PNM with ReteClima o ForestaMI), helps to come in contact with lots of companies who wants to do team building activities and CSR activities.

Benefits.

Creating a urban forest has numerous outputs that makes it a proper multifunctional green infrastructure. Benefits can be described considering the park, nature ecosystem and park users:

Park benefits

- General increase of natural areas;
- Increment in quantity and quality of habitat for urban animals;
- Improvement of public image;
- Improvement of ecosystem services offer;
- Possibility to involve people in forestry project.

Natural ecosystems benefits

- Increase of natural areas connectivity;
- Diversification of habitats and microhabitats (quantity and quality);
- Possibility to recreate type of forests almost disappeared;
- Diversification of the landscape;
- Release of deadwood matters and improvement of related decomposers.

Park users benefits

- Possibility to access different ecosystems services (i.e. socio-cultural ecosystems services);
- Diversification of the urban landscape;
- Cooling effects due to tree's presence;
- Filtration of air pollution.
- Improvement of the physical and mental health of residents.



Constraints.

Implementing urban forest may include some hindrances that can hamper and slow down the whole process of its realization.

To avoid them, you should make sure of:

- Choose the correct tree species: native tree species should be the first choice, however, these species can be more susceptible to climate change or human pressure (e.g. air pollution). To solve these problems, it is possible to use a mix of native and ornamental (non-invasive) species.

- In times of climate change, water needs are among the most important factors to keep in mind. Periods of severe drought and/or heat are becoming more frequent and how and when you irrigate can affect the forest's thriving.



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Parco Nord
Milano